

# LYME DISEASE

**Also known as:** Lyme borreliosis and Tickborne meningopolyneuritis

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## **Responsibilities:**

**Hospital:** Report by IDSS, mail, fax or phone

**Infection Preventionist:** Report by IDSS, mail, fax or phone

**Lab:** Report by IDSS, mail, fax or phone

**Physician:** Report by mail, fax or phone

**Local Public Health Agency (LPHA):** No followup required by LPHA

**Iowa Department of Public Health**

**Disease Reporting Hotline: (800) 362-2736**

**Secure Fax: (515) 281-5698**

## **1) THE DISEASE AND ITS EPIDEMIOLOGY**

### **A. Agent**

Lyme disease (LD) is caused by the corkscrew-shaped bacterium (spirochete) *Borrelia burgdorferi*.

### **B. Clinical Description**

Lyme disease is a systemic, tick-borne disease with a variety of manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is erythema migrans (EM), the initial skin lesion that occurs in 60%-80% of patients. EM is a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing. Secondary lesions also may occur. Round erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as EM. For most patients, the expanding EM lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mildly stiff neck, arthralgia, or myalgia. These symptoms are typically intermittent. Laboratory confirmation is recommended for persons with no known exposure.

#### **Early Localized**

Signs and symptoms during the early illness tend to be nonspecific and include fever, muscle aches, headache, mild neck stiffness, and joint pain. Erythema migrans (EM) occurs at the site of the tick bite in approximately 90% of cases, although when these painless lesions occur in a location hidden from view (armpit, back, etc.), the patient does not often see them. Typically, EM rashes are circular and grow to a diameter of 5 to 15 cm, although the shape can be triangular, oval, or irregular. EM frequently clears in the center, resulting in the classic "bull's-eye" presentation, but this does not always occur. The rash may be reported as warm or itchy, but it is usually painless.

#### **Early Disseminated**

In untreated persons, multiple EM rashes may appear within 3 to 5 weeks after the tick bite. These secondary lesions, indicative that the infection has spread into the blood, resemble the primary lesion but tend to be smaller. Common signs of early disseminated disease also include mild eye infections and the paralysis of facial muscles (Bell's palsy). More systemic signs of this stage are headache, fatigue, and muscle and joint pain. At this stage, disruptions of heart rhythm occur in < 10% of cases.

#### **Late**

Most commonly, late disease is marked by recurrent arthritis (swelling and pain) in the knees and shoulders. Other joints may also be involved. Neurological signs may involve impairment of mood,

sleep, or memory; paralysis of facial muscles; pain or tingling sensations in the extremities; and less commonly, meningitis and encephalitis. Late-stage symptoms can persist for several years, but tend to resolve spontaneously.

Generally, prophylactic antibiotic therapy is not indicated after a tick bite, as the risk of infection with *B. burgdorferi* after a tick bite is relatively low, even in endemic areas.

### **C. Reservoirs**

The primary vectors for Lyme Disease (LD) are *Ixodes* ticks, a distinct genus from the larger and better-known dog tick (*Dermacentor variabilis*). In Iowa, the prominent vector is *I. scapularis*, or the deer tick. Ticks acquire the spirochete that causes LD during their young, larval stage by feeding on infected animals, especially the white-footed mouse. The tick poses the greatest threat of transmitting infectious organisms to animals and humans when it bites during its next (nymphal) stage of life. Nymphs are most abundant between May and July, and they are typically found in grasses and brush. Towards the end of summer through fall, the ticks mature to the adult stage. Although adult ticks remain capable of transmitting *B. burgdorferi* to humans, they are less likely to do so.

### **D. Modes of Transmission**

Lyme disease is acquired from a tick bite. Laboratory data suggest that the tick must usually remain attached for 24 to 48 hours before the transmission of *B. burgdorferi* can occur. Since bites from *I. scapularis* are often painless and may occur on parts of the body that are difficult to observe, cases of diagnosed LD frequently have no known history of a tick bite.

### **E. Incubation period**

EM typically develops between 7 - 10 days after exposure (range 3 - 32 days). However, an infected individual can remain asymptomatic until the later stages of LD, several months to one year later.

### **F. Period of Communicability or Infectious Period**

Lyme disease is not communicable from person-to-person.

### **G. Epidemiology**

Lyme disease is the most commonly reported vectorborne illness in the U.S. In 2013, it was the 5th most common nationally notifiable disease. In 2013, 94% of Lyme disease cases were reported from 12 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New Hampshire, New York, Pennsylvania, Virginia, and Wisconsin.

The incidence of Lyme disease is associated with the density of infected tick vectors. While most cases in the United States have been reported in the Northeast, West, and upper Midwest, nearly all states have reported cases. LD incidence varies greatly among states, among counties, and by season. Most cases occur between April and October, when the risk of contact with nymphal ticks is greatest. In Iowa most cases occur in the northeast corner of the state.

### **H. Bioterrorism Potential**

None.

## **2) DISEASE REPORTING AND CASE INVESTIGATION**

### **A. Purpose of Surveillance and Reporting**

- To identify where Lyme disease occurs in Iowa.
- To recognize areas in Iowa where Lyme disease incidence has changed (increased or decreased).
- To focus preventive education.
- To target tick control measures.

## **B. Laboratory and Healthcare Provider Reporting Requirements**

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing IDSS. However, if IDSS is not available, the reporting number for the IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE  
Lucas State Office Building, 5<sup>th</sup> Floor  
321 E. 12<sup>th</sup> St.  
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the IDPH clearinghouse. Call (319) 398-5133 or visit the website: [healthclearhouse.drugfreeinfo.org/cart.php?target=category&category\\_id=295](http://healthclearhouse.drugfreeinfo.org/cart.php?target=category&category_id=295) to request a supply.

### **Laboratory Testing Services Available**

Laboratory confirmation of infection with *B. burgdorferi* is established when a laboratory isolates the spirochete from tissue or body fluid, detects diagnostic levels of IgM or IgG antibodies to the spirochete in serum or cerebrospinal fluid, or detects a significant change in antibody levels in paired acute and convalescent serum samples. Since the immune response to spirochetes is relatively slow, serological tests often remain negative for several weeks after exposure. The Centers for Disease Control and Prevention (CDC) recommends that, initially, serum specimens be tested by a sensitive test such as an enzyme immunoassay (EIA) or immunofluorescent assay (IFA). Samples with positive or equivocal results from these tests should be re-tested using a standardized Western blot procedure.

The University of Iowa State Hygienic Laboratory (SHL) will perform Lyme disease confirmatory testing by Western blot assay on either acute or convalescent sera that are either positive or equivocal by a Lyme-specific test, such as EIA or IFA. The State Hygienic Laboratory will also identify ticks potentially carrying *B. burgdorferi*. Finally, the State Hygienic Laboratory will also refer samples to the CDC for testing. For more information about submitting sera for testing or ticks for identification, contact the SHL at (319) 335-4500.

## **C. Local Public Health Agency Follow-up Responsibilities**

Case Investigation: The Iowa Disease Surveillance System (IDSS) is the preferred method of completing disease investigations.

If the patient is unable or unwilling to be interviewed during the investigation, in IDSS select the appropriate reason under the Event tab in the Event Exception field.

## **3) CONTROLLING FURTHER SPREAD**

### **A. Isolation and Quarantine Requirements**

None.

### **B. Protection of Contacts of a Case**

None.

### **C. Preventive Measures**

Generally, prophylactic antibiotic therapy is not indicated because the risk of infection with *B. burgdorferi* after a tick bite is relatively low, even in endemic areas.

Offer the following advice to the public to reduce risk for Lyme disease.

### Environmental Measures

Prevention of Lyme disease involves keeping wildlife (especially deer and rodents) out of your backyard and making your yard less attractive to ticks.

- Remove leaf litter and brush from around your home.
- Prune low-lying bushes to let in more sunlight.
- Mow lawns regularly.
- Make sure any plants near your home are not varieties that attract deer.
- Keep woodpiles in sunny areas off the ground.
- Clean up the ground around bird feeders.
- If you are going to use insecticides around your home, always follow the label instructions and never apply these chemicals near streams or other bodies of water.

### Preventive Measures/Education

The best preventive measure is to avoid tick-infested areas. If in areas where contact with ticks may occur, individuals should be advised of the following:

- Wear long-sleeved shirts and long, light-colored pants tucked into socks or boots.
- Stay on trails when walking or hiking and avoid high grass.
- Use insect repellants properly. Repellants that contain DEET (diethyltoluamide) should be used in concentrations no higher than 15% for children and 30% for adults. Remember, repellants are not recommended to be used on infants. Permethrin is a repellant that can only be applied to clothing, *not* exposed skin.
- After each day spent in tick-infested areas, check yourself, your children, and your pets for ticks. Areas ticks prefer most include the back of the knee, armpit, scalp, groin, and back of the neck.
- Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out with steady pressure. Once removed, the tick should be drowned in rubbing alcohol or flushed down the toilet.

## 4) ADDITIONAL INFORMATION

If a tick is available it may be sent for testing. Place tick in plastic bag, with a tissue and one to two drops of water, seal, place in envelope with your name, address, and phone number and mail to:

Iowa State University  
Department of Entomology  
440 Science II  
Ames, IA 50011-3240

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Lyme Disease can be found at: [www.cdc.gov/osels/ph\\_surveillance/nndss/phs/infdis.htm#top](http://www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top)

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

## References

- American Academy of Pediatrics. *2009 Red Book: Report of the Committee on Infectious Diseases, 28<sup>th</sup> Edition*. Illinois, American Academy of Pediatrics, 2009.
- American Lyme Disease Foundation, Inc. *A Quick Guide to Lyme Disease: How to Protect Yourself and Your Family from Serious Infection*. (Not dated.)
- Heymann, D., ed. *Control of Communicable Diseases Manual, 20<sup>th</sup> Edition*. Washington, DC, American Public Health Association, 2015.
- Centers for Disease Control and Prevention. [www.cdc.gov/lyme/](http://www.cdc.gov/lyme/)
- CDC Notice to Readers Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease, MMWR August 11, 1995 / 44(31);590-591
- [www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm)